

TYPHOON HATTIE (22W)

I. HIGHLIGHTS

Hattie, the last of six tropical cyclones to form in September, was the fourth tropical cyclone in a six-week period to affect Okinawa and southern Japan. Its track was a classic example of recurvature.

II. CHRONOLOGY OF EVENTS

- 280600Z - First mentioned on Significant Tropical Weather Advisory as an area of persistent convection with an estimated minimum sea-level pressure of 1010 mb.
- 300730Z - Tropical Cyclone Formation Alert followed a flare up of deep convection and the first Dvorak intensity estimate of 1.0.
- 301800Z - First warning based on intensification manifested by the cirrus outflow layer showing signs of rapid growth, appearance of overshooting cumulonimbus tops, and a CI 2.0.
- 011200Z - Upgraded to tropical storm due to increase in convective extent and organization.
- 030000Z - Upgrade to typhoon based on the formation of a small eye on satellite imagery and a CI 4.0.
- 040000Z - Peak intensity - 90 kt (46 m/sec) - based on a decrease in eyewall cloud top temperatures and a CI 5.0.
- 071200Z - Downgraded to a tropical storm due to increased upper-level westerly wind shear and loss of central convection.
- 080600Z - Final warning issued following Hattie's transformation into an extratropical cyclone.

III. TRACK AND MOTION

As Typhoon Gene (21W), which had just recurved, accelerated towards the main islands of Japan on 28 September, Hattie formed in the monsoon trough 100 nm (185 km) east of Guam. Hattie followed a smooth track west-northwestward, slowed late on 4 October as it approached the lighter winds near the axis of the subtropical ridge, and recurved just to the west of Okinawa late on 5 October. Then on 7 October, Hattie accelerated northeastward in the strong southwesterly flow and churned by Tokyo, Japan on 8 October.

IV. INTENSITY

For a three-day period, 29 September to 1 October, Hattie's intensification was arrested by westerly winds aloft and to the north. On 1 October, anticyclonically curved cirrus outflow was observed to push northward from the depression's cloud system center (Figure 3-22-1), and Hattie began to intensify at a normal rate of one T-number per day. This steady intensification continued until 4 October, when the typhoon peaked at 90 kt (45 m/sec)(Figure 3-22-2). Hattie maintained its peak intensity for almost two days before moving into the strong vertical shear region north of the subtropical ridge axis. The typhoon weakened as it lost central convection and transitioned to an extratropical system on 8 October.

V. FORECASTING PERFORMANCE

The first three warnings issued by JTWC were based on Hattie's poorly defined cloud system center and verified significantly south of track (Fig 3-22-3). Then warning 04 relocated Hattie's center to the north as the convection consolidated the low-level circulation. All subsequent track forecasts verified well. In particular, three consecutive warnings beginning 48 hours prior to the recurvature point achieved exceptionally low 72-hour forecast errors near 90 nm (165 km).

VI. IMPACT

Typhoon Hattie passed 30 nm (55 km) west of Okinawa, causing damage in excess of \$1.7 million to U.S. military bases. Roof damage and beach erosion were extensive. Maximum wind gusts as high as 75 kt (38 m/sec) were recorded on Okinawa. On a positive note, the water rationing in since mid-September was lifted. Total rainfall from Flo (20W), Gene (21W) and Hattie provided 15-20 inches (380-510 mm) to fill up the almost empty reservoirs.

After Hattie recurved, it tracked along the south coast of Japan, bringing heavy rains and strong winds. Three people in Shikoku were killed and 14 injured as the bus they were riding in was struck by a landslide.

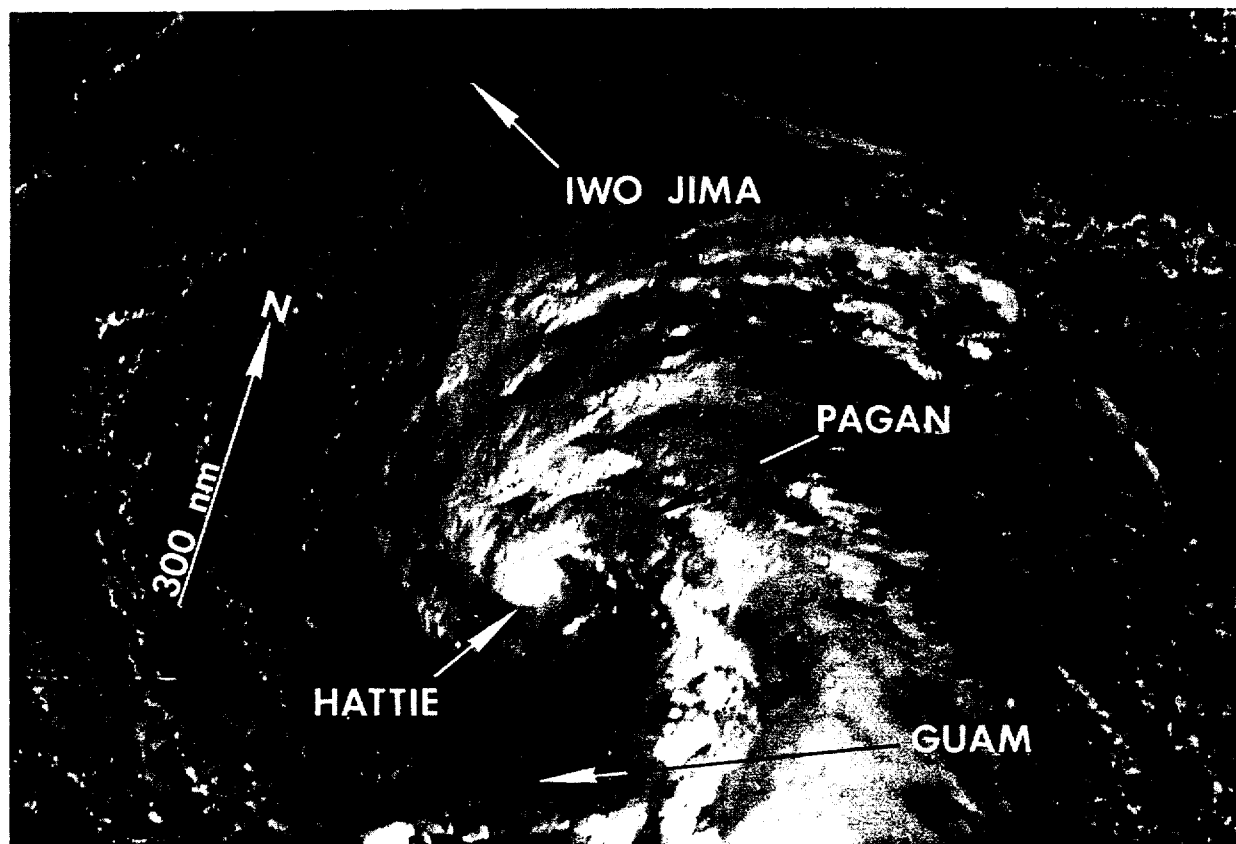


Figure 3-22-1. Hattie intensifies and its cirrus outflow pushes northward (012330Z October DMSP visual imagery).

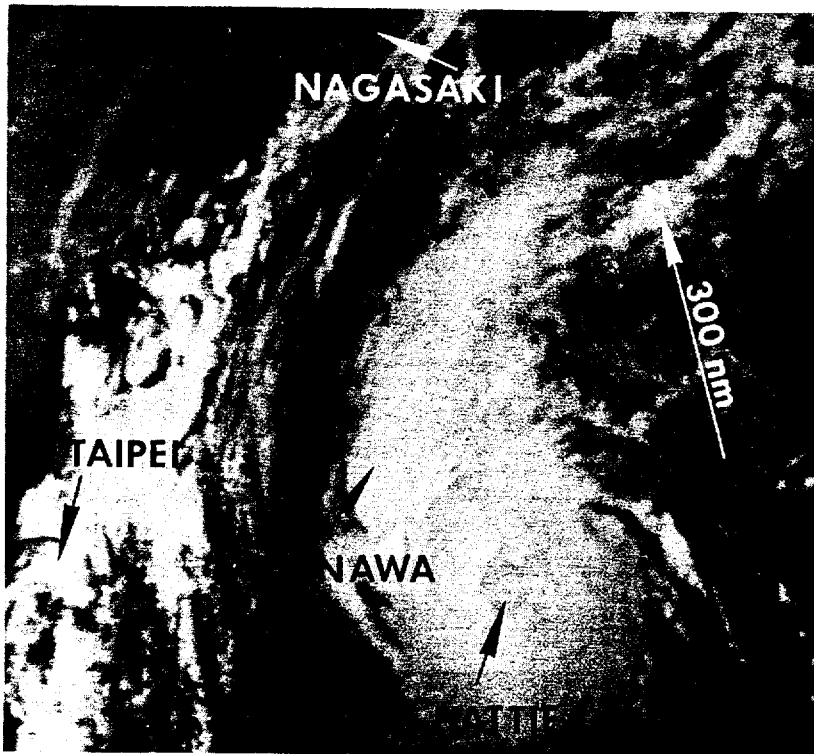


Figure 3-22-2. Typhoon Hattie at peak intensity (041307 October DMSP nighttime visual imagery).

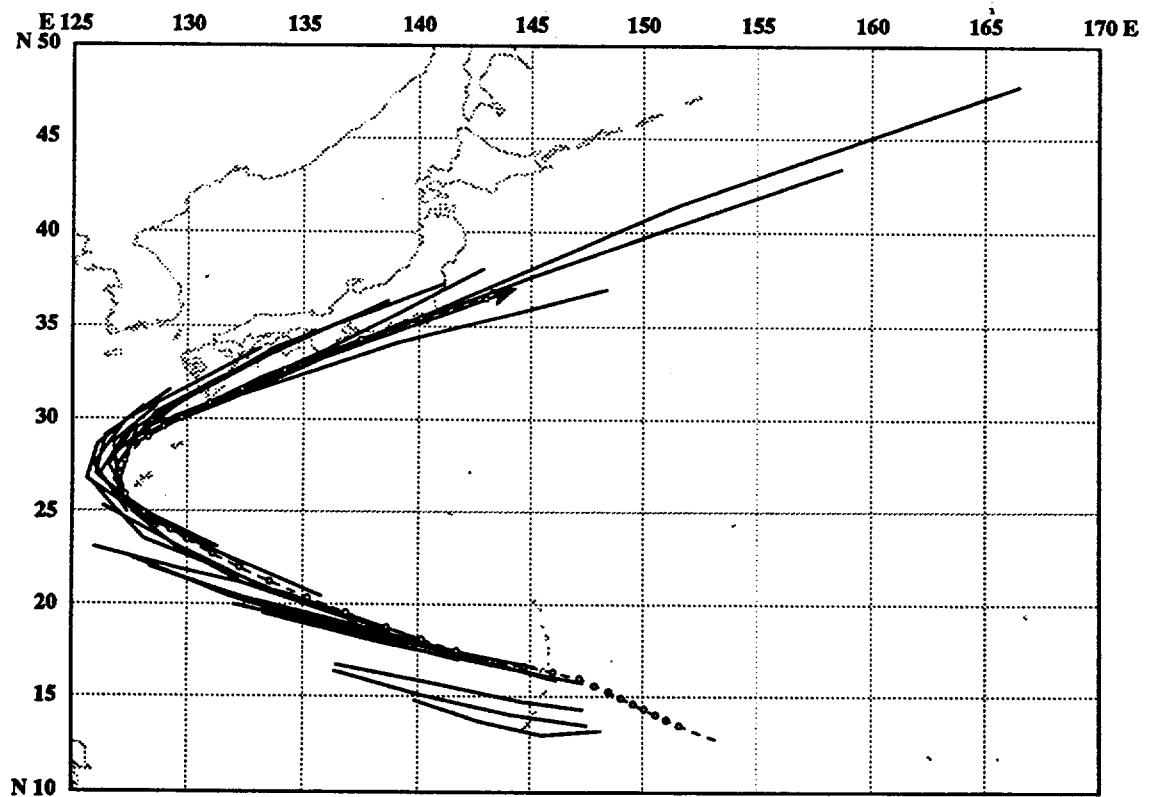


Figure 3-22-3. Summary of JTWC forecasts (solid lines) for Hattie is superimposed on the final best track (dashed line).